Biomechanics
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Lecture – 32
Spine Muscles

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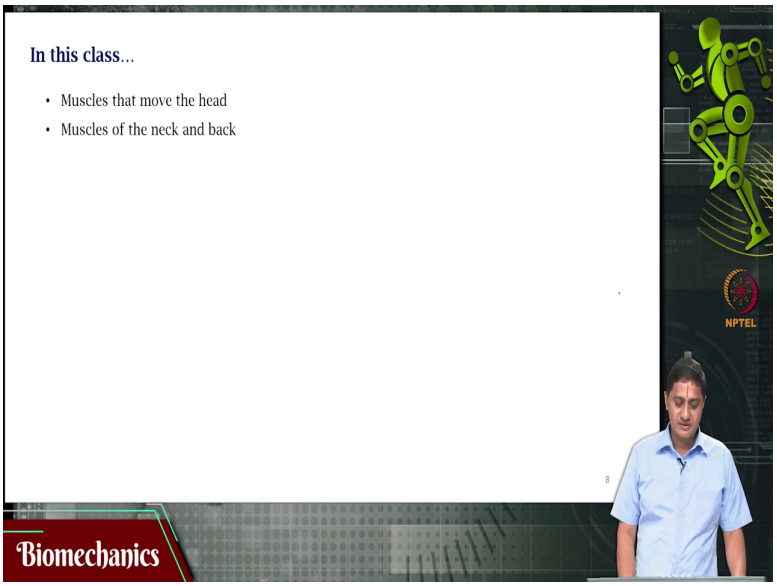

Welcome to this video on biomechanics. In this video we will be looking at biomechanics of the spine. More specifically in this video we will be discussing the muscles that are responsible for movement of the neck and the head and muscles at the level of the neck and the back.

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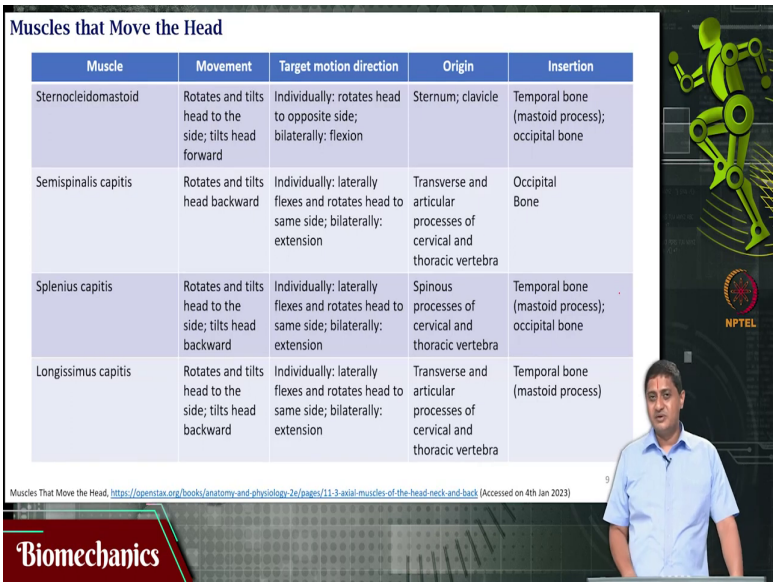

The head in humans it is placed at the top of the vertebral column already I mentioned that is a special nature of the human head in terms of the heavier weight when compared with the body weight right. When compared with other animals the head of humans is bigger because they have a bigger brain there is a purpose for this of course. So, this head will have to be supported and there is a very important constraint to maintain the level of the head at that level.

So, the head should not fall like this it should be stabilized there are some constraints on the posture of the head and the neck very considered very critical for brain function for general function of the body. The head is attached we mentioned where it is. So, the occipital bone at the level of the occiput that is attachment with the atlas which is the first cervical vertebra is it not that the atlas this joint is called as atlanta occipital joint we mentioned that.

So, there is a very small amount of movement of fraction extension that is possible but mostly its purpose is to provide a receptacle to provide a seed to hold the head in space it does not allow any other movement other than the small amount of flexion extension this joint does not allow for any other movement. So, the main purpose seems to be stabilizing the head right balancing the head.

So, it is the head is stabilized or balanced moved and rotated movement lateral movement front back movement and rotation movement all are possible by the muscles that are present at the level of the neck right what are these muscles? One muscle is called sternocleidomastoid right what is this muscle?

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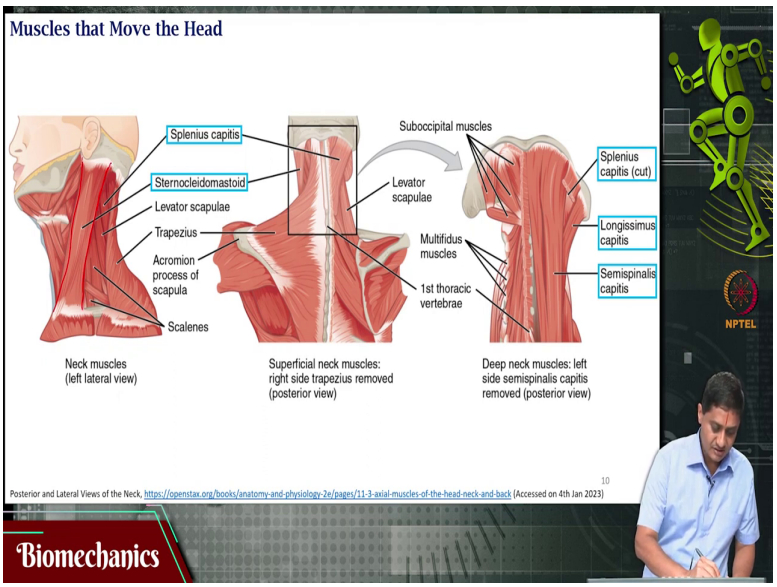

That is that muscle is it not right its origin and insertion are as shown. So, attaches at that level. So, its origin is at the sternum or clavicle and its insertion is the mastoid process the temporal bone and the occipital bone. So, just below the ears right just at the level of the ear, what is the purpose? What is the action of this muscle it rotates and tilts the head to the side; rotate and tilt to the side very important function.

You might wonder what is the purpose of this right. So, when you tilt you can tilt like this later moment is possible and you can also rotate like this but the sternocleidomastoid when it is contracting it has a purpose where you can rotate as well as tilt. For example I am interested in looking backward on something that is on my right side like that I'm interested in looking at rotate and tilt.

So, my head is tilted at the same time it is rotated looking at that direction you also can look at the back like this. So, sternocleidomastic can rotate and tilt the head to the side and also of course tilt the head to the forward direction. So, individually individually when each one of them is performing. So, there are two sides right the left side and the right side on the left side and on the right side when both of them are acting together when both of them are acting together they perform flexion action.

But only when one of them is acting the other one is not activated at the same time then it rotates the head to the opposite side when this muscle is active that is the look that you are getting and when this muscle is active that is the look that you are getting right. Then you

have the next muzzle that is semi spinalis capitas that is not clearly visible at the level of the neck. It is a deep muscle difficult for me to show in my body difficult for me to show.

It is a deep muscle of the neck because sternocleidomastoid is a muscle that I can show like this it is a superficial muscle right. I can show superficial means something that is at the surface deep means something that is not at the surface something that is below other muscles that are difficult to access and show for example in this video. Deep muscle one part of the semispinal is capitas is removed to show the other semispandalous capities here is the right sort of the semi spinal is capital that is shown right.

What is the purpose when only one of them is active its function is to laterally flex and rotate the head to the same side lateral flexion that lateral flexion right its origin is at the transverse an article process cervical and thoracic vertebra. So, it is starting at the level of cervical and thoracic vertebra and attaches to the occipital bone. So, attaches to the head right it is a deep muscle and the function is to rotate and tilt the head backwards.

So, when that muscle is active. So, this is a muscle that is at the back of the head at the neck deep inside. So, you cannot see it at the surface it is deep inside but at the back of the neck. So, when that muscle is contracting I will be able to do that action right head rotate the head backward rotate until the head backward like that right that function. Then splenius cavities this again you know starts at the level of cervical and thoracic vertebra origin is at the level of cervical and thoracic vertebra.

And attachment or insertion is at the level of temporal bone of the and occipital bone and temporal bones means mastered process let us go back and check this splinous cavities right that is that muscle I said that that muscle are here it is shown relatively small muscle unlike the chernocleidomastoid this is relatively difficult to find but is still not a very deep muscle. What is the purpose what is a function?

The function is rotates and tilts head to the side until the head backwards. So, one function is performed by more than one muscle this is not new to us right for example the PSI in the case of elbow flexion brachialis brachi radius biceps all of them perform the same function right elbow fraction. oh And individually when they work only one side when it is active laterally flexes and rotates the head to the same side.

When both of them are active it extends the head. Then you have longissnus capities; longissnus capities it is again origin is cervical and thoracic vertebra at the transverse and articular process good. Insertion is also approximately the same location at the temporal bone which is this muscle is it not deep muscle somewhat difficult to identify deep muscle longissnus capities this one right that muscle is relatively hard to identify from the surface.

What is the purpose? What is the action? Individually lateral flexion and rotates the head to the same side and when both of them are active extension of the head. So, the movement is rotates and tilts the head to the side and tilts the head backward that is the function of this longissnus capitis. So, these are the muscles that are responsible for movement at the level of the neck or movement of the head turns out that this has a very important evolutionary purpose is it not.

If or when we were hunters and gatherers when we were hunters and gatherers if a predator animal is coming is approaching and you are hearing some noise that a predator animal is approaching you will have to turn back and look in various directions and accordingly take action. So, a very important function and crucial advantage for humans is that they are able to stand about six feet tall and with their vision able to see any approaching predator in the savannah in the grassland.

When the approaching predator is coming you are in a position to view from a relatively tall from a relatively higher elevation right you are able to get that vision and that head which is why balancing and viewing of that head in various directions becomes absolutely crucial for survival because if you do not look in the direction of the Predator it is likely that you will be taken out so, crucial evolutionary function of head momentum in this.

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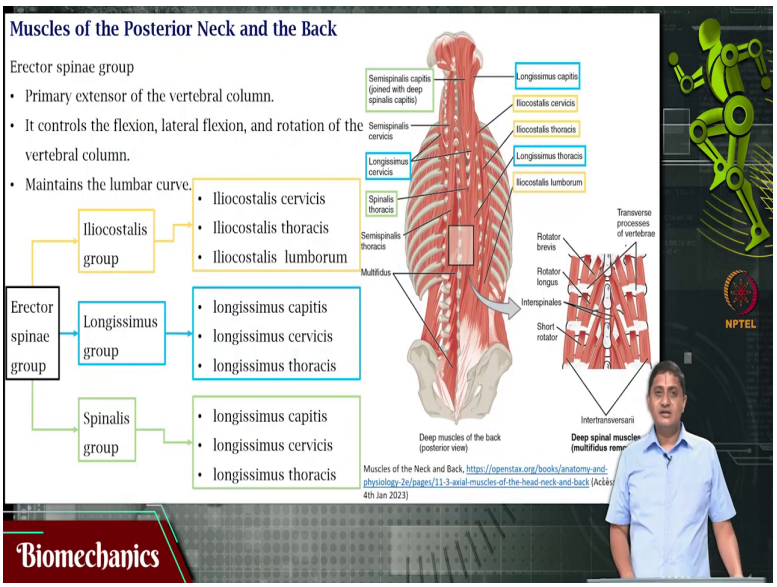

Then have the muzzle or the group of muscles or the set of all muscles that together constitute the so-called erector spinae group of muscles. This is not a single muscle this is the muscle that is found in the back it is a large muscle or large set of muscles however they want to call this. This is essentially what constitutes the back the so-called muscle mass at the back is provided for by this single muscle or group of muscles called erector spinning.

What is the function extensor of the vertebral column doing that but that is not the only function there are many different small things that each one of this sub component of this electrospinatus which we will see in some level of detail right. Also it is responsible for control of other movements such as flexion later reflection and rotation. So, flexion at the elbow flexion at the elbow lateral flexion and rotation all of this are possible to be controlled by co-activation of the corresponding erector spinal muscle or that part of the rectal spinner muscle on the other side right something to keep in mind.

It can be divided into three broad groups right Ilicostalis group longissnus group and spinalis group. The Ilicostalis group is the group that is placed most laterally you see that one Ilicostalis at the level of the neck is called as iliocastalis cervices at the level of the thorax is called Ilicostalis thoracis and then at the level at the level of the lumbar vertebra it is called as Ilicostalis lumboro.

Those that are present most lateral from the axis are called Ilicostalis group and those that are present at the level of the neck are called iliocasterless cervices those that are present at the level of the thorax is called Ilicostalis thoracis at the level of the lumbar vertebra or the

lumbar region though they are called Ilicostalis is lumborum. Those that are present slightly more medially when compared with Ilicostalis but not the most medial level are at the intermediate level between most medial and the most lateral are called longissmus group.

Already we saw one of these muscles that is the logissmus capities right. This loggissmus capities is at the level of the head you have this longissmus capitis at the level of the head. Then at the level of the neck you have the at the level of the neck you have longissmus cervices then at the level of the thorax you have longissmus thoracis. Then you have the muscles that are most medially located.

These muscles constitute the spinalis group this is at the level of the spine right these are not longissmus capities longissmus cervices and longissmus thorasis but rather spinalis cavities spinalis there is a little mistake in this that is ok we will correct this spinalis capitis spinal services and spinalis thorasis right. The capitis is located at the level of the head cervices is located at the level of the neck and thoracis is located at the level of the thorax.

So, the most medial one for example is the spinalis muscle and at the level of the thorax is called spinalistoriasis right. The intermediate one at the level of the neck is called longissmus services. So, let us review this those that are located most lateral are called Ilicostalis. Those that are located at an intermediate level in this in the medial lateral direction those that are located intermediate intermediately between medial and lateral are called as longissmus group.

And those that are located closest to the spine are most medial is called spinalis group. Those that are located at the level of the neck are always called cervices those that are located at the level of the thorax are called thoracis those that are located at the level at the level of the lumbar region are called lumborum this is applicable only at the level of Ilicostalis. Intermediate and the spinalis or longissmus spinalis intermediate and the most medial muscles are called longissmus and spinalis.

Those that are located at the level of the head are called capitis those that are located at the level of the neck are called cervices those that are located at the level of the thorax are called thoracis so which is how we are getting these names. Remember that in the third group it is

spinalis capitis spinal services and spinalis thoracis these are the various muscles that together constitute the erector spine group.

The largest muscle and those that form the muscle mass at the back right muscle mass at the back.

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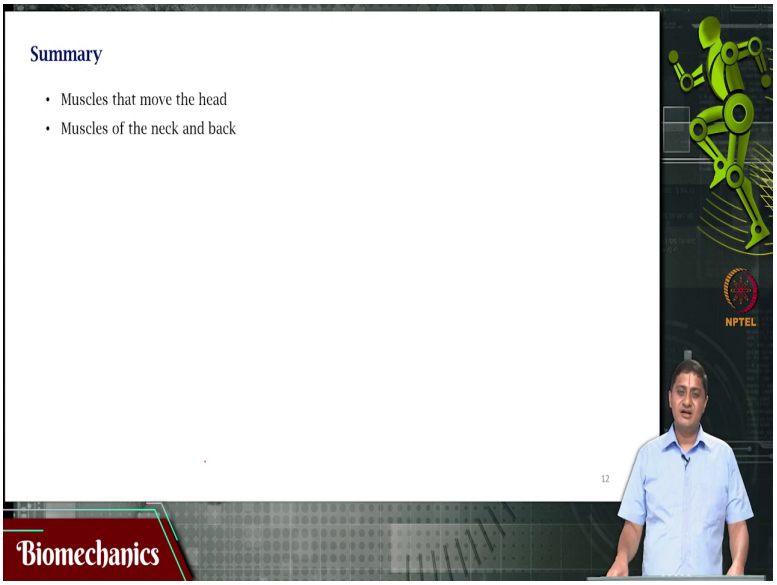

So, with this we come to the end of this video. So, in this video we saw muscles that move the head and muscles that are present at the neck and the back which is the and in particular we looked at some good detail about the various sub parts of the erector spinea group. Thank you very much for your attention.